

## BOOK REVIEWS

*Catalysis and Automotive Pollution Control*, Proceedings of the First International Symposium (CAPOC 1), Brussels, Sept. 8-11, 1986, edited by A. DRUCQ and A. FRENNET, Unité de Recherche sur la Catalyse, Université Libre de Bruxelles, Brussels, Belgium, (Studies in Surface Science and Catalysis, 30) 1987, 520 pages, price: US \$ 113.25/Dfl. 255.00, ISBN 0-444-42778-3.

In June 1984 the EEC Commission proposed new standards of permissible exhaust gas from motor vehicles to be introduced in Europe; these standards were approved by the Ministers of the Environment one year later. As the control of automotive pollution is at present mainly a catalytic problem, it was decided to hold an International Symposium on the subject, and an organizing committee composed of people engaged in catalytic research in the different Belgian Universities was constituted. This was the first Symposium of its kind to be held on an international level, and the quality and scientific interest of the papers presented was exceptional. It is planned to hold a follow-up Symposium in 2 to 3 years' time.

The first part of the book is a general introduction to the problem of automotive pollution. The second, properly catalytic, part is devoted to fundamental and applied studies on pollution control, with emphasis on exhaust catalytic converters.

Contents: Foreword. Acknowledgements. Financial Support. List of Participants. Scientific Papers. General Introduction to the Problem of Exhaust Gas Pollution. Effect of Motor Vehicle Pollutants on Health (M. CHIRON). Automotive Traffic. Risks for the Environment (R. IMPENS). Catalysis in Modern Petroleum Refining (J. GROOTJANS). The Point of View of the Automobile Industry. Prevention is Better than Cure (C. GERRYIN). Control of Diesel Particulate Emissions in Europe (M. P. WALSH). The Problems Involved in Preparing and Upholding Uniform Exhaust-Gas Standards Within the Common Market (H. HENSSLER). The Market for Car Exhaust Catalysts in Western Europe. A Review of Trends and Developments (W. GROENENDAAL). General Introduction to the Role of Catalysis in Exhaust Gas Control. Automobile Catalytic Converters (K. C. TAYLOR). Aspects of Automotive Catalyst Preparation, Performance and Durability (B. J. COOPER et al.). Reaction Mechanisms and Surface States. Titrations of Carbon Monoxide and Oxygen on a Platinum on Silica Catalyst (C. O. BENNETT et al.). The A/F Window with Three-Way Catalyst. Kinetic and Surface Investigations (E. KOBERSTEIN, G. WANNEMACHER). Elemental Steps During the Catalytic Decomposition of NO Over Stepped Single Crystal Surfaces of Pt and Ru (N. KRUSE, J. H. BLOCK). Periodic Operation Effects on Automotive Noble Metal Catalysts. Reaction Analysis of Binary Gas Systems (H. SHINJOH et al.). The Role of Research in the Development of New Generation Automotive Catalysts (H. S. GANDHI, M. SHELEF). Mechanisms of the Carbon Monoxide Oxidation and Nitric Oxide Reduction Reactions Over Single Crystal and Supported Rhodium Catalysts: High Pressure Rates Explained Using Ultrahigh Vacuum Surface Science (G. B. FISCHER et al.). Electronic State of Cerium-Based Catalysts Studied by Spectroscopic Methods (XPS, XAS) (F. Le NORMAND et al.). An AES Investigation of the Reactivity of Pt, Rh and Various Pt-Rh Alloy Surfaces Towards O<sub>2</sub>, NO, CO and H<sub>2</sub> (F.C.M.J.M. Vvn DELFT et al.). Reactivity Studies of Automobile Exhaust Catalysts in Presence of Oxidising or Reducing Conditions (G. MEUNIER et al.). The Effect of Weight Loading and

Reduction Temperature on Rh/Silica Catalysts for NO Reduction by CO (W. C. HECKER, R. B. BRENNEMAN). Reactivation of Lead-Poisoned Pt/Al<sub>2</sub>O<sub>3</sub> Catalysts by Sulfur Dioxide (J. W. A. SACHTLER et al.). Support. Alumina Carriers for Automotive Pollution Control (P. NORTIER, M. SOUSTELLE). Advances in Automotive Catalysts Supports (J. S. HOWITT). Structural Consideration with Respect to the Thermal Stability of a New Platinum Supported Lanthanum-Alumina Catalyst (F. OUDET et al.). Influence of the Porous Structure of Alumina Pellets and the Internal Convective Flow on the Effective Diffusivity of Exhaust Gas Catalyst (S. CHENG et al.). The Effect of the Chemical Nature of the Wash-Coat on the Catalytic Performance of CO Oxydation Catalysts of Monolith Type (L. B. LARSSON et al.). Metal-Support Interaction. The Promotion of Pt/SiO<sub>2</sub> Catalysts by WO<sub>3</sub> for the NO-CO Reaction (J. R. REGALBUTO, E. E. WOLF). Surface Diffusion of Oxygen in Rh/Al<sub>2</sub>O<sub>3</sub> and Pt/Al<sub>2</sub>O<sub>3</sub> Catalysts (H. ABDERRAHIM, D. DUPREZ). Rhodium-Support Interactions in Automotive Exhaust Catalysts (C. Z. WAN, J. C. DETTLING). Base Metal Catalysts. Development of a Copper Chromite Catalyst for Carbon Monoxide Automobile Emission Control (J. LAINE et al.). Development of Non-Noble Metal Catalysts for the Purification of Automotive Exhaust Gas (LI WAN et al.). Improving the SO<sub>2</sub> Resistance of Perovskite Type Oxidation Catalyst (LI WAN et al.). Tungsten Carbide and Tungsten-Molybdenum Carbides as Automobile Exhaust Catalysts (L. LECLERQ et al.). Practical Studies. Dynamic Behavior of Automotive Three-Way Emission Control Systems (R. K. HERZ). Effect of Lead on Vehicle Catalyst Systems in the European Environment (M. KILPIN et al.). A laboratory Method for Determining the Activity of Diesel Particulate Combustion Catalysts (R. E. MARINANGELI et al.). Fuels and Additives. Synthesis of Higher Alcohols on Low-Temperature Methanol Catalysts (G. FORNASARI et al.). An Alkene Isomerization Catalyst for Motor Fuel Synthesis (B. G. BAKER, N. J. CLARK).

Lucjan Pawłowski

*Handbook of Polycyclic Hydrocarbons. Part B: Benzenoid Hydrocarbons*, J. R. DIAS, Department of Chemistry, University of Missouri-Kansas City, Kansas City, MO, U.S.A. (Physical Sciences Data, 30), 1987, xii + 388 pages, price: US \$ 124.50/Dfl. 280.00, ISBN 0-444-42802-X.

This reference book provides an overview of the field of polycyclic aromatic (benzenoid) hydrocarbons, grouped into a systematic framework for the first time. A comparison of the number of benzenoid isomers that have been synthesized and reported in the open literature versus the theoretical number possible is presented, together with a formula periodic table for benzenoid hydrocarbons, based on graph theoretical principles.

In the first part of the book, nomenclature and classification scheme, graph theory, and spectroscopic principles of benzenoid hydrocarbons are discussed in detail. The second part compiles the experimental and theoretical properties of 471 benzenoid hydrocarbons. Data given for each compound include: melting point, boiling point, solubility, details on the synthesis/isolation, spectral data (UV, NMR), molecular orbital data, applications, known carcinogenicity, and literature references.

Analytical, organic, synthetic, and theoretical chemists working in the environmental and petroleum fields will find this reference an indispensable source of information on benzenoid hydrocarbons. A second volume is in preparation, covering the rest of the polycyclic and heterocyclic hydrocarbons.

Contents: 1. Nomenclature for Fused Benzenoid Hydrocarbons. Introduction. Alternative Nomenclature Systems. The Nomenclature Adopted in this Reference. 2. A Formula Periodic Table for Polycyclic Aromatic Hydrocarbons. Graph Theoretical Relationships. The Formula Periodic Table for Even Carbon PAHs. 3. Benzenoid Isomer Enumeration. Introduction. General Principles. Benzenoid Isomer Enumeration. 4. Spectroscopy of Benzenoid Hydrocarbons. Ultraviolet Spectroscopy. Photoelectron Spectro-

scopy. Infrared Spectroscopy. Nuclear Magnetic Resonance Spectroscopy. Prediction of Absorption Maxima and Ionization Potentials. Determination of Select Eigenvalues by Topological Inspection. Appendix A: Glossary of Terms. Appendix B: Equations Applicable to Totally Fused PAHs. 5. Compilation of Polycyclic Hydrocarbons and their Chemical Properties. Tabulation Guidelines. Cata-Condensed Benzenoid Hydrocarbons. Benzenoid Hydrocarbons Having Two Internal Carbons. Benzenoid Hydrocarbons Having Four Internal Carbons. Benzenoid Hydrocarbons Having Six Internal Carbons. Benzenoid Hydrocarbons Having Eight to Twelve Internal Carbons.

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*Wastewater Treatment by Ion Exchange*, edited by B. A. BOLTO and L. PAWŁOWSKI, E. and F. N. SPON, London–New York 1987, 262 pages, price: 24.5 £, ISBN 0-419-13320-8.

The more stringent requirements for the treatment of wastewaters to render them fit for disposal into natural waterways and the increasing concern over the depletion of supplies of raw materials for industry have focused attention on methods of both cleaning up effluents and recovering valuable materials from them. The purpose of that book is to present a concise account of the application of ion exchange to separating the components of wastewater with particular emphasis on industrial wastewaters. These are more complex than domestic sewage, offer more scope for the isolation of valuable chemicals, and are more readily treated by adsorption techniques.

The problem of disposing of industrial wastes is as old as industry itself; there has also been considerable effort devoted to water reuse. The present emphasis is on the recovery of other wastewater components, the value of which provides the economic incentive. This need must escalate rather than slacken in the years ahead.

Authors have endeavoured to concentrate on treatment methods which are in active use in industry, or have at least progressed to the pilot-plant stage. Their message is that the technology now exists for the separation of wastewater components under almost any set of circumstances.

The book consists of 15 chapters. First three of them are excellent introduction into ion exchange technology. They allow readers not familiar with ion exchange technology and engineering to understand their specificity.

These introductory chapters are followed by the following chapters: Renovation of exhausted process liquors, Recovery of mineral acids and their salts by site-sharing and ion-retardation techniques, Recovery of water and chemicals from electroplating rinse waters, Recovery of heavy metals from wastewaters, Recycling of condensate constituents, Reuse of sewage effluents, Recovery of organic chemicals, Stability of ion-exchange resins, Contacting equipment for fixed-bed processes, Contacting equipment for continuous processes, Optimization of operations, Catalogue of commercial resins.

The authors use flowsheets depicting very clearly all possible processes where ion exchange techniques can be used for recovery of water and/or chemicals from wastewater.

Both authors are well known ion exchange specialists. Dr. B. A. BOLTO is a continuator of the scientific school established 40 years ago by D. E. Weiss at CSIRO in Australia. He is a co-author of a few well known ion exchange technologies; the best known are sirotherm, sirofloc, and that based on magnetic resins.

Dr. L. PAWŁOWSKI is a young, very active Polish scholar. He has contributed noticeably to application of ion exchange methods for recovery of water and chemicals from wastewater. Dr. PAWŁOWSKI's papers

on treatment of plating or nitrogen fertilizer effluents are well known. He is also a co-editor of a frontier journal on ion exchange, *Reactive Polymers*.

I am giving some information about authors, mostly for readers who are not working in ion exchange area. It is important to know who are the authors, because the other characteristic feature of that book is, that the authors very often express their personal views on the approach to solve particular problems by use of ion exchange methods.

The book is of particular interest for those involved in wastewater treatment, since it provides whole spectrum of information about new, not widely known processes, which seems to be very attractive for recycling for wastewater components.

*Andrzej Bieganski*